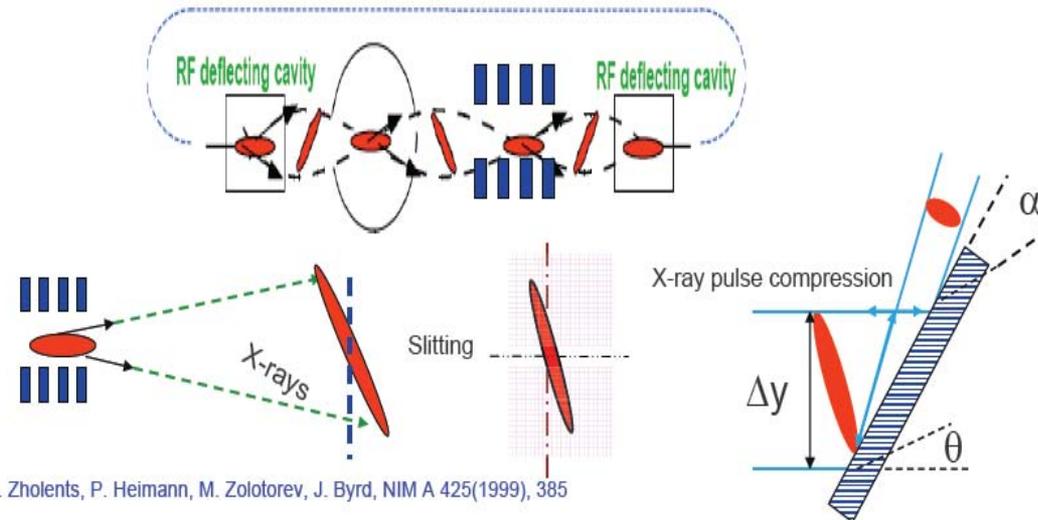




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Overview of the CW picosecond source project at the APS



Ali Nassiri (On Behalf of the SPX Team)

Advanced Photon Source

Satellite Workshop on Short Pulse X-rays at the APS

May 9, 2008 - ANL



UChicago
Argonne_{LLC}



A U.S. Department of Energy laboratory
managed by UChicago Argonne, LLC

SPX Team

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Collaborators

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P. Kneisel (JLab)
L. Turlington (JLab)
Derun Li (LBL)
V. Dolgashev (SLAC)
K. Hosoyama (KEK)
J. Shi (Tsinghua University- Beijing), PhD Candidate

SPX Project Goals

- Deliver x-ray pulse lengths of 1 - 2 ps FWHM for photon energies of 4 keV or greater.
- Provide energy tunability
 - ~200 eV – 100 keV
 - *Longer x-ray pulse lengths for softer photons*
- Provide high repetition rate
 - Multi-MHz
- Provide $10^4 - 10^6$ photons/pulse

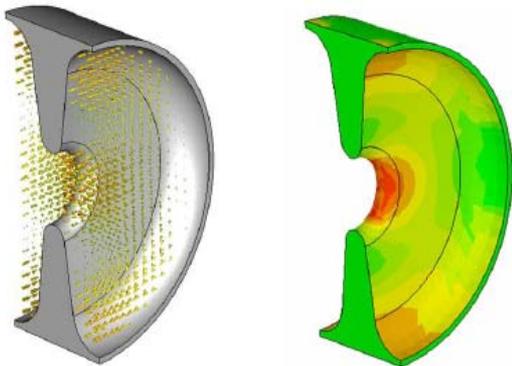
$$\frac{\sigma_{E_{ph}}}{E_{ph}} = 10^{-4} - 10^{-2}$$

- Flexibility in operating modes
- Provide chirped pulses to a single or double APS sectors
- No impact on other users outside the chirped sectors

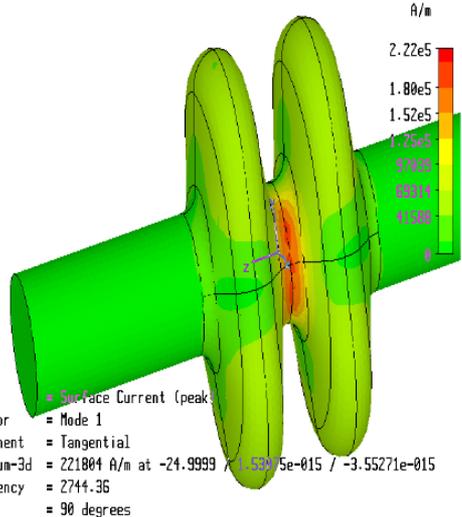
Conceptual Design Effort

■ Cavity modeling, design and analysis (2815 MHz)¹

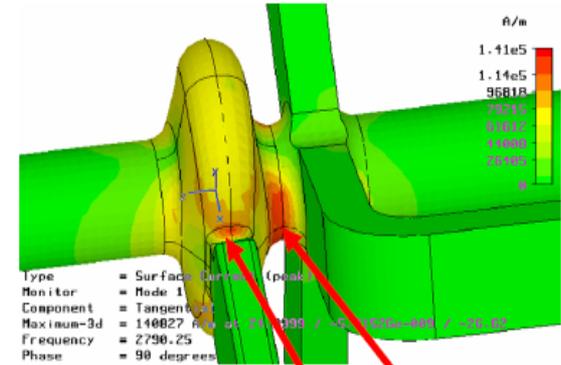
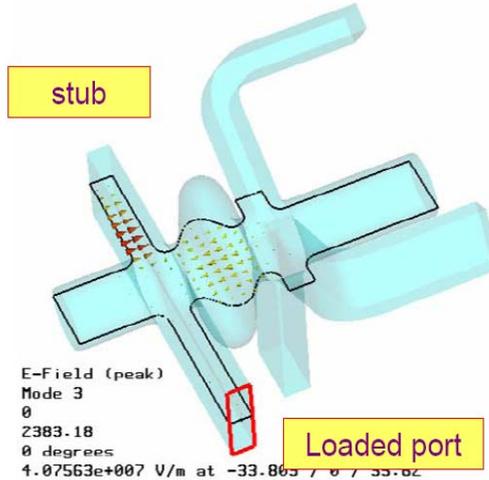
Deflecting cavity



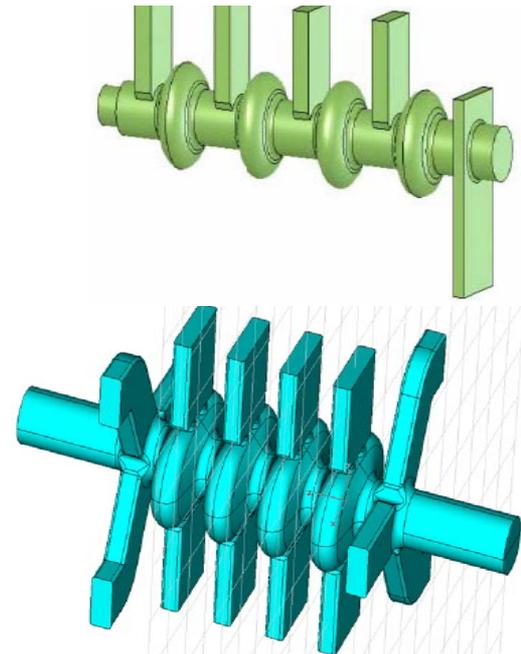
Field distribution, maximum Magnetic field at different regions



Bmax/Vdef=157mT/MV (single-cell) to 260mT/MV (two-cell)



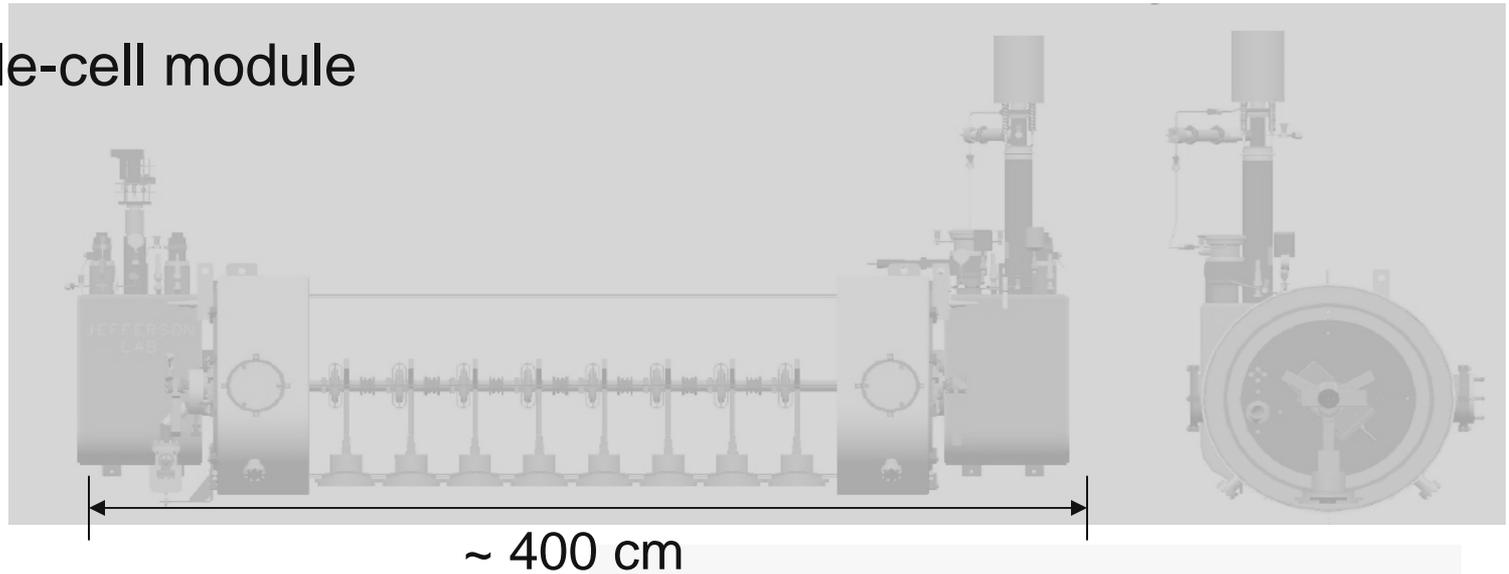
Hot spot



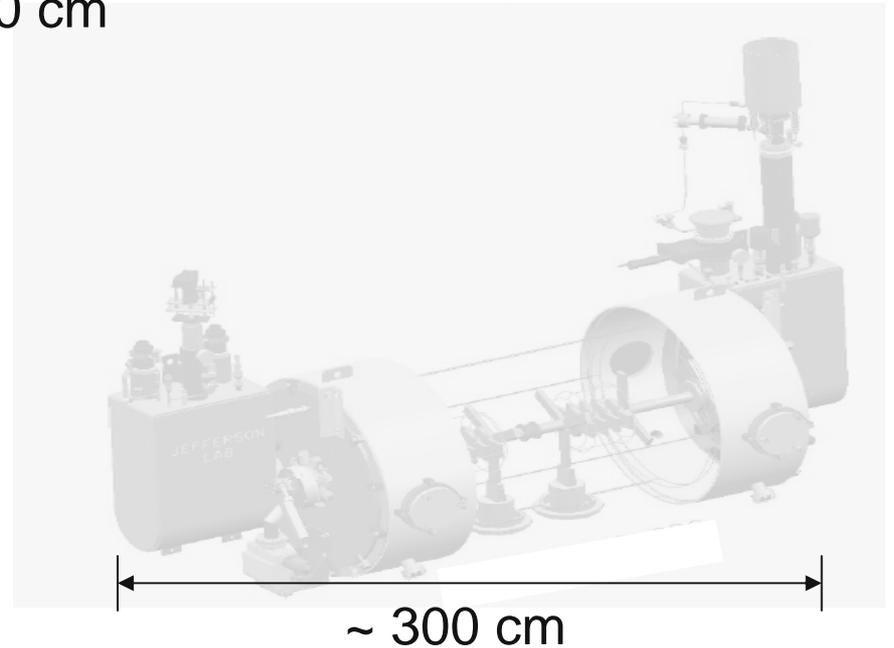
¹ In collaboration with JLab and Tsinghua Univ.

Possible Cryomodule Concept

- Ten single-cell module



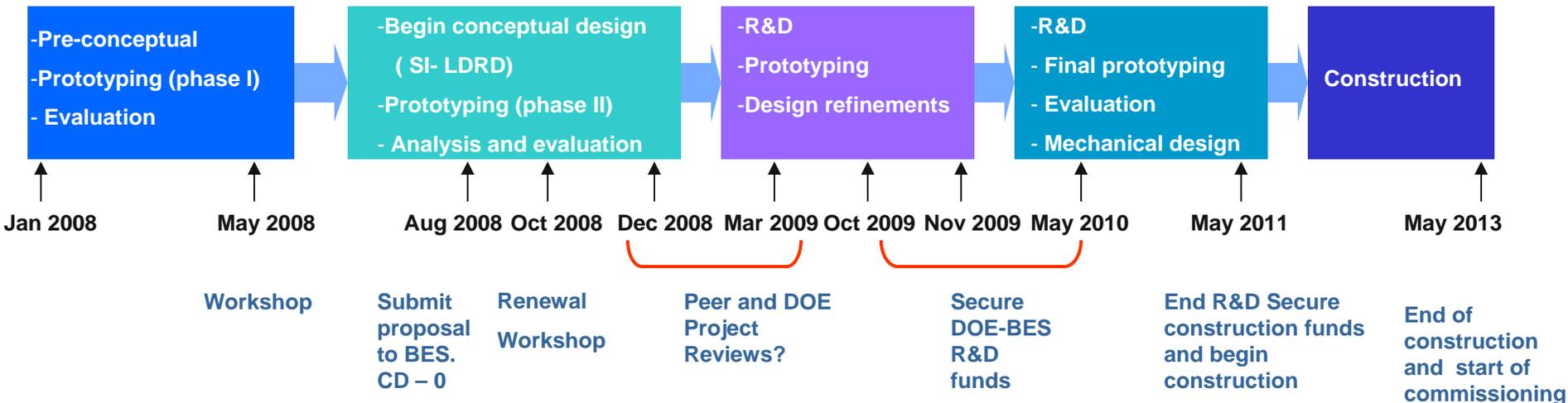
- Multi-cell module



Drawing: Courtesy Jim Henry, JLab

Planning and Projected Timeline

- R&D - 3 years
- Construction – 2 years



- This is consistent with the APS Renewal plan (5 -10 years).¹
 - It is part of upgrades which satisfy the science needs of the APS users in the next decade.
- It will lay the foundation for the APS Upgrade (APS 2020).

¹ Murray Gibson, "Update on the Advanced Photon Source", User Wee 2008, May 4, 2008.